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This is a longitudinal investigation of the intellectual growth of groups of Negro and white students. Multivariate analyses of variance were conducted for grades five, seven, nine, and 11 on student scores from STEP (Sequential Tests of Educational Progress), SCAT (School and College Ability Tests), and a measure of socioeconomic status (SES) taken from the Background and Experience Questionnaire, all of which were administered as part of the Educational Testing Service Study of Academic Growth and Prediction. Some 316 Negro and 501 white students constituted the sample. The data indicated that: (1) test scores of white subjects were significantly higher than Negroes at grade five on all tests of SCAT, STEP, and a measure of SES; (2) when analyses of variance were used to equate on racial differences in SCAT and STEP, whites were found not only to start out higher, but to grow at a faster rate than Negroes on most battery tests; (3) both Negro and white subjects continued to grow and gain on all tests of SCAT and STEP; and (4) Negro academic students showed accelerated growth rates on reading and listening relative to white nonacademic students in one town, but not in the other. (Author/PS)

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Division 17

Symposium: Exploration in Vocational Development and Education

NEGRO WHITE DIFFERENCES IN INTELLECTUAL GROWTH

by

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CG 003 101

INTRODUCTION

Over the past 30 years there has been considerable consistency in the research published concerning racial differences. The results generally indicate that average scores made by Negro groups on intelligence tests are consistently and significantly lower than those made by white groups in the same communities. (e.g., Coleman, 1966, Tyler, 1956) Almost all of these investigations, however, have been cross-sectional in nature. This approach involves testing different samples of subjects at each grade level under concern. One of the most recent nationwide studies of this type was conducted by Coleman in 1966. He reports that whites scored higher than Negroes in each region of the United States and at each grade level investigated. In addition, he found that test score differences between Negro and white students were greater at grade 12 than those initially present at grade 1. These results are fairly typical of cross-sectional findings and are frequently used to provide evidence of differential rates of intellectual growth for Negro and white students.

Few, if any, longitudinal studies of Negro and white patterns of intellectual growth have been reported. The longitudinal approach involves repeated measurements on the same subjects at different points in time. Since this design actually observes changes in people over time rather than inferring such changes from different samples, it provides more appropriate data regarding patterns of intellectual growth than cross-sectional investigations.

The purpose of this paper is to report on a longitudinal investigation of the intellectual growth of groups of Negro and white students.

Method

Multivariate analyses of variance (MANOVA) of grades 5, 7, 9, and 11 were conducted on student scores from STEP (Sequential Tests of Educational Progress), SCAT (School and College Ability Tests), and a measure of socio-economic status taken from the BEQ (Background and Experience Questionnaire) all of which were administered as part of the ETS Study of Academic Growth and Prediction. Subjects in this study consisted of 817 students (316 Negro and 501 white) for whom complete data were available for each variable in the study for the grades noted. Subjects were drawn from two cities—one Midwestern and one Western. The proportion of Negroes in the six study schools ranged from 10 to 90 per cent of the student bodies. The requirement of complete data stated above necessitated both continued attendance in high school as well as stable residence in the communities included in this investigation. It would seem then, that the subjects in this study, particularly the Negro group, represent a fairly select sample.

At each grade, the MANOVA program treated the following factors as design parameters:

Sex	(2)	(Male and Female)
Curriculum	(2)	(Academic and Nonacademic)
Cities	(2)	(One Midwestern and one Western)
Schools	(6)	(Three from each city)
Race	(2)	(Negro and white)

The relationship of these factors to the following variables was then examined:

SCAT	(2 scores)	(Verbal and Quantitative)
STEP	(6 scores)	(Reading, Writing, Listening, Social Studies, Math, and Science)
BEQ-SES	(1 score)	

Results

Before presenting the results, a note of caution should be expressed concerning a significant limitation of the study. As indicated in an earlier presentation, the study from which these data were drawn was not originally intended as an investigation of Negro-white differences. Therefore, the present study is not as comprehensive or complete as it might have been and still leaves many questions unanswered. The results of this study are presented in detail in Tables 1 and 2 and Figures 1 to 5. For purposes of this paper, however, I would like to highlight several aspects of the results.

A. Grade 5

1. The main effect of race was significant. A general achievement discriminant function emerged indicating that white subjects were significantly better on all tests of SCAT and STEP, and that there was a significant difference in SES by race.
2. The main effect of curriculum was significant. A general achievement discriminant function emerged indicating that those students who later enroll in the academic curriculum were significantly better on all tests of SCAT and STEP at grade 5 than those students who later enrolled in nonacademic curricula. There was also a significant difference in SES by curriculum.

3. There were significant differences within schools in Town A and schools within Town B, indicating that some schools in each town were more effective in terms of student performance on SCAT and STEP than others. In both cities, the schools that were lowest in achievement appeared to be predominantly Negro.
4. A further investigation of the subjects in the study revealed that for white students there were three times as many academics as nonacademics. For Negroes, however, there were twice as many nonacademics as academics.
5. It would thus appear that in interpreting the large differences found between races, one must be aware of the fact that some of these differences were confounded with curriculum and/or school. This study describes what happened, but cannot explain why it happened.

B. Grade 7/5

1. The Town x Curriculum x Race (TCR) interaction was significant. The discriminant function it produced was characterized by STEP Listening and SES. Figure 1 contains plots of this interaction. Note particularly, the increased rate of growth for Academic Negroes relative to nonacademic whites in Town A—but not in Town B.
2. The main effect of race was significant and seemed quite independent of the TCR interaction. The discriminant function was characterized by STEP Math as well as SCAT Verbal and Quantitative, and SES. This indicated that even after equating for initial differences in SCAT and STEP, white students grew at a faster rate between grades 5 to 7 on SCAT Verbal and Quantitative, and STEP Math than Negroes.

C. Grade 9/547

1. The TCR interaction was significant and a discriminant function characterized by Reading and SES was produced. Figure 2 contains plots of this interaction. Note particularly, the increased rate of growth for academic Negroes relative to nonacademic whites between grades 7 and 9 in Town A, but not Town B.
2. The main effect of race was significant and again seemed quite independent of the TCR interaction. The discriminant function was characterized by STEP Math and Writing as well as SCAT Verbal and Quantitative. This indicated that after equating fifth and seventh grade SCAT and STEP results, whites grew at a faster rate than Negroes on Math, Writing, Verbal, and Quantitative.

D. Grade 11/5479

1. The main effect of race was significant. The discriminant function was characterized by STEP Math and Science, as well as SCAT Verbal, Quantitative, and SES. This indicated that after equating on fifth, seventh, and ninth grade SCAT and STEP scores, whites grew at a faster rate than Negroes on Math, Science, Verbal, and Quantitative.

In Summary then, the data indicate that the

1. Test scores of white subjects were significantly higher than Negroes at grade 5 on all tests of SCAT, STEP, and a measure of SES. This finding was in agreement with the results of most cross-sectional studies.

2. When analyses of covariance were used to equate on racial differences in SCAT and STEP, it was found that whites not only start out higher, but continue to grow at a faster rate than Negroes on most tests in the battery. Negro-white differences in test performance, however, did not vary uniformly across all tests. There were tests in the battery and time periods during which Negro and white students grew at the same rates when initial differences between the two groups were taken into account.
3. This finding of increasing differences between Negroes and whites differs from Coleman's results in the metropolitan Midwest and West. He found little or no decline in the test performance of Negroes relative to whites in these parts of the United States.
4. The data indicate that even through white grow at a faster rate than Negroes on most tests in the battery, both Negro and white subjects continued to gain and grow on all tests of SCAT and STEP. There was no test on which Negroes or white showed a decline from one testing period to the next. This finding was true, regardless of the curriculum in which they were enrolled.
5. It is evident that the TCR interactions should be further explored to determine why Negro academic students show accelerated rates of growth on Reading and Listening relative to white nonacademic students in one town but not another. It is hoped that further explorations into these differences between towns will yield results useful in creating more favorable conditions for learning in other school settings.

References

Coleman, J. S., et al Equality of Educational Opportunity, Washington, D.C., U.S. Government Printing Office, 1966.

Tyler, L. E. The Psychology of Human Differences, New York, Appleton-Century-Crofts, 1956.

Table 1

Significant Multivariate F Ratios at Grades 5, 7, 9, and 11

	Grade 5			Grade 7			Grade 9			Grade 11		
Source	F	df	p less than	F	df	p less than	F	df	p less than	F	df	p less than
Town x Curriculum x Race (TCR)	N.S.	-	-	2.22	(9, 758)	.019	1.87	(9, 750)	.054	N.S.	-	-
Race	15.04	9, 766	.001	2.99	(9, 758)	.002	3.01	(9, 750)	.002	4.17	(9, 742)	.001
Curriculum	18.62	9, 766	.001	5.82	(9, 758)	.001	6.22	(9, 750)	.001	5.15	(9, 742)	.001
Sex	17.94	(9, 766)	.001	12.09	(9, 758)	.001	10.04	(9, 750)	.001	7.37	(9, 742)	.001
Schools within Town A	9.49 2.89	(18, 1532) (8, 766)	.001 .004	5.33	(18, 1516)	.001	4.48	(18, 1500)	.001	8.51 3.54	(18, 1484) (8, 742)	.001 .001
Schools within Town B	15.18 2.43	(18, 1532) (8, 766)	.001 .013	8.18	(18, 1516)	.001	8.23	(18, 1500)	.001	6.62 2.23	(18, 1484) (8, 742)	.007 .024
Town	14.91	(9, 766)	.001	24.02	(9, 758)	.001	36.45	(9, 750)	.001	9.43	(9, 742)	.001

*Grade 5 STEP and SCAT included as covariates in grade 7 MANOVA; both grade 5 and 7 SCAT and STEP included as covariates in grade 9 MANOVA; grades 5, 7, and 9 SCAT and STEP scores included as covariates at grade 11.

Table 2

Titles for Discriminant Functions Associated with Significant Effects at Grades 5, 7, 9, and 11

Source	Grade 5	Grade 7	Grade 9	Grade 11
Town x Curriculum x Race (TCR)		1. Listening and SES	1. Reading and SES	
Race	1. General achievement and ability, plus SES	1. Math, Verbal, Quantitative, plus SES	1. Math, Writing Verbal, plus SES	1. Math, Science, Verbal, Quantitative, plus SES
Curriculum	1. General achievement and ability, plus SES	1. General achievement and ability	1. Verbal, Quantitative, and Reading	1. Social Studies, Reading, Writing, Verbal, and Quantitative
Sex	1. Reading, Writing, and Verbal	1. Writing, Quantitative, and Science	1. Listening	1. Science, Writing, and Quantitative
Schools within Town A	1. General achievement and ability 2. Science, Math, Social Studies, and Reading	1. Math, Listening, Verbal, plus SES	1. Verbal and SES	1. Listening and SES 2. Reading
Schools within Town B	1. General achievement and ability 2. Math, Social Studies, and Verbal	1. Listening and SES	1. Math, Writing, Verbal, plus SES	1. SES 2. Listening, Writing, Quantitative
Town	1. Quantitative plus SES	1. Listening plus SES	1. Science, Listening, and Quantative	1. Quantative plus SES

TOWN A

T.S LISTENING (STEP)

TOWN B

GRADE 5 7 9 11

GRADE 5 7 9 11

300

290

280

270

260

250

240

300

290

280

270

260

250

240

Converted Score

White Academic

White Nonacademic

Negro Academic

Negro Nonacademic

TOMB A

TOMB READING (STOP)

TOMB B

GRADE 5 7 9 11

GRADE 5 7 9 11

300

290

280

270

260

250

240

Capitalized Score

White Academic

White Nonacademic

Negro Academic

Negro Nonacademic

SCAT

VERBAL

GRADE 5 7 9 11

QUANTITATIVE

GRADE 5 7 9 11

300
290
280
270
260
250
240

CONVERTED SCORE

White

Negro

WRITING

GRADE 5 7 9 11

STEP

GRADE 5 7 9 11

SCIENCE

300

290

280

270

260

250

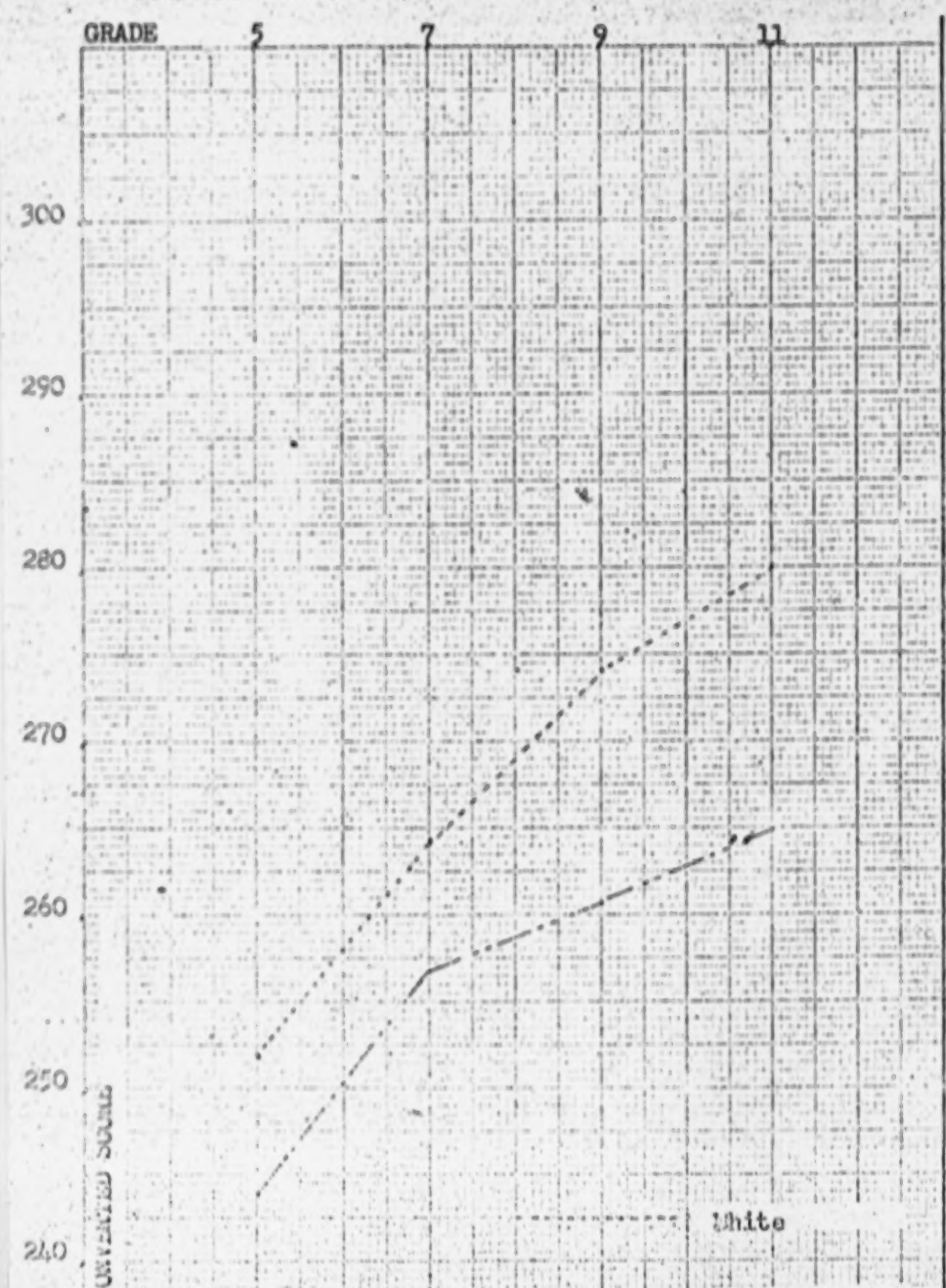
240

Converted Score

White

Negro

Social Studies



STEP

Math